

‘Real world’ populations compared to clinical trials: Can electronic record linkage be used to identify trial eligible patients?

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Background: The Cancer Medicines Outcomes Programme aims to develop a process to determine clinical outcome data of cancer medicines in Scotland using routinely collected, electronically linked health records. Such, ‘real world’ patient populations are not necessarily directly comparable to clinical trial populations suggesting that outcome data from clinical trials may not provide a suitable benchmark. It is therefore important to be able to describe the demographics of a population to contextualise outcome data.

Aim & objectives: The aim of this study was to determine whether electronic record linkage (ERL) could be used to evaluate the potential eligibility of patients for inclusion in a relevant clinical trial. More specifically, the objectives were: to understand the applicability of the trial inclusion and exclusion criteria used for the pivotal abiraterone and enzalutamide trials to routinely collected healthcare data and to calculate the proportion of patients in NHS Greater Glasgow and Clyde (GGC) being treated with these medicines who would have matched the trial eligible population.

Methods: Patients being treated with abiraterone or enzalutamide, either post or pre chemotherapy, between 2012 and 2015 within NHS GGC were identified using the Chemotherapy Electronic Prescribing and Administration System. This information was linked to data from the Prescribing Information System (PIS; community prescribing); the Scottish Cancer Registry (SMR06); Scottish Morbidity Records, inpatient episodes and outpatient appointments (SMR01 and SMR00); and the Scottish Care Information store (laboratory test results) within the NHS GGC Safe Haven.

Trial eligibility criteria were identified through published trial protocols,^{1–4} and their applicability to ERL evaluated by reviewing the content, coding and completeness of the data available. While all inclusion criteria needed to be met in order to be eligible for a trial, exclusion from a trial occurred when at least one of the exclusion criteria applied. Suitable criteria were then applied to the identified NHS GGC patient cohort, and the proportions of patients potentially eligible for the trials were calculated.

Results: A total of 70 different eligibility criteria were identified across the four trials: 19 inclusion criteria and 51 exclusion criteria.

On average, 63.5% of inclusion criteria (range 44.4%–81.8%) and 55.3% of exclusion criteria (range 33.3%–74.4%) could be identified using ERL. While certain patient characteristics and laboratory test results were easily and unambiguously identifiable within electronic patient records, other criteria were associated with a degree of uncertainty. Comorbidities for instance could only be approximated based on the information available (see Table 1 for details).

Among the 261 patients being treated with abiraterone or enzalutamide, an estimated 46.4% (range 33.3%–55.4%) may have had comparable demographics to the respective clinical trial populations.

Table 1. Availability of the eligibility criteria used in the abiraterone and enzalutamide clinical trials, using electronic record linkage.

Category	Examples	Availability using ERL ^a
Patient characteristics	Age, ECOG performance status	Yes
Laboratory tests results	testosterone, haemoglobin, albumin, platelet count, potassium, bilirubin	Yes
Prior cancer treatment	previous chemotherapy, surgery, immunotherapy, radiotherapy	Partially ^b
Comorbidities	other cancers, liver disease, heart disease, uncontrolled hypertension, gastrointestinal disorders potentially interfering with drug absorption, conditions pre-disposing to seizures	Partially ^c
Concomitant medication	opioid for cancer pain, 5α-reductase inhibitors, androgen receptor antagonists, atypical antipsychotics, lithium, insulin, tricyclic and tetracyclic antidepressants	Partially ^d
Other	asymptomatic or mildly symptomatic disease based on BPF-SF questionnaire; estimated life expectancy of ≥6 months; brain metastasis	No

BPF-SF: Brief Pain Inventory, short form; ECOG: Eastern Cooperative Oncology Group; ERL: electronic record linkage.

^aFor any missing values, e.g. performance status, laboratory test results, it was assumed that these met the criteria.

^bIdentification of prior surgery was made based on assumptions regarding included procedures; prior radiotherapy treatment was not used due to incomplete records.

^cComorbidities were identified based on assumptions regarding applicable ICD-10 codes as insufficient detail was available from published trial protocols, and not all mentioned comorbidities could be identified from the datasets available for analysis.

^dConcomitant medication was included regardless of indication as this information is not available from the PIS; non-prescription drugs and medication dispensed during hospital in-patient stays were not included.

Conclusion: Although many eligibility criteria used in the clinical trials could be applied to ERL, others could not. Nevertheless, ERL can be used to estimate the number of patients being treated with a specific cancer medicine who may have been eligible for inclusion in the respective trial – information that could be useful when comparing results from an observational study to clinical trial results.

References

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